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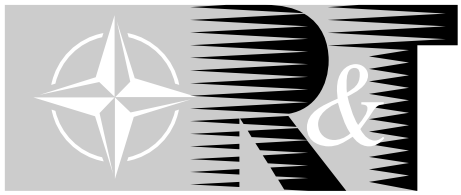

RESEARCH AND TECHNOLOGY ORGANISATION

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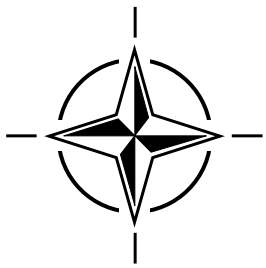
RTO TECHNICAL REPORT 69

Handbook on Long Term Defence Planning

(Manuel sur la planification de défense à long terme)

Work performed by the RTO Studies, Analysis and Simulation Panel (SAS).



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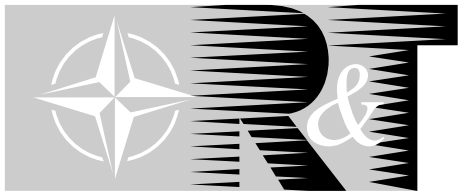

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The Research and Technology Organisation (RTO) of NATO

RTO is the single focus in NATO for Defence Research and Technology activities. Its mission is to conduct and promote cooperative research and information exchange. The objective is to support the development and effective use of national defence research and technology and to meet the military needs of the Alliance, to maintain a technological lead, and to provide advice to NATO and national decision makers. The RTO performs its mission with the support of an extensive network of national experts. It also ensures effective coordination with other NATO bodies involved in R&T activities.

RTO reports both to the Military Committee of NATO and to the Conference of National Armament Directors. It comprises a Research and Technology Board (RTB) as the highest level of national representation and the Research and Technology Agency (RTA), a dedicated staff with its headquarters in Neuilly, near Paris, France. In order to facilitate contacts with the military users and other NATO activities, a small part of the RTA staff is located in NATO Headquarters in Brussels. The Brussels staff also coordinates RTO's cooperation with nations in Middle and Eastern Europe, to which RTO attaches particular importance especially as working together in the field of research is one of the more promising areas of initial cooperation.

The total spectrum of R&T activities is covered by the following 7 bodies:

- AVT Applied Vehicle Technology Panel
- HFM Human Factors and Medicine Panel
- IST Information Systems Technology Panel
- NMSG NATO Modelling and Simulation Group
- SAS Studies, Analysis and Simulation Panel
- SCI Systems Concepts and Integration Panel
- SET Sensors and Electronics Technology Panel

These bodies are made up of national representatives as well as generally recognised 'world class' scientists. They also provide a communication link to military users and other NATO bodies. RTO's scientific and technological work is carried out by Technical Teams, created for specific activities and with a specific duration. Such Technical Teams can organise workshops, symposia, field trials, lecture series and training courses. An important function of these Technical Teams is to ensure the continuity of the expert networks.

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Handbook on Long Term Defence Planning

(RTO TR-069 / SAS-025)

Executive Summary

Introduction

The purpose of this handbook is to enhance Long Term Defence Planning (LTDP) across the NATO community by synthesizing applied national and NATO planning principles. In addition to serving as a guide for the individual user, the Handbook also serves as a common framework meant to facilitate communication about LTDP issues within the Alliance and its members and Partnership for Peace nations. The Handbook focus is the entirety of the LTDP process, rather than its detailed mechanisms. Within that process, the planning context itself and the translation of plans into executive actions are also addressed.

Long term planning (LTP) is essential to organisations facing the combined impact of uncertainty of the future and little flexibility with regards to resource employment. For NATO and nations, planning has become more complex after the Cold War. From a planning situation characterised by a single dominant threat and short-term adjustments to capitalise on new technology and to counter threat developments, the situation of today calls for a much broader approach to embrace the diversity of future defence challenges.

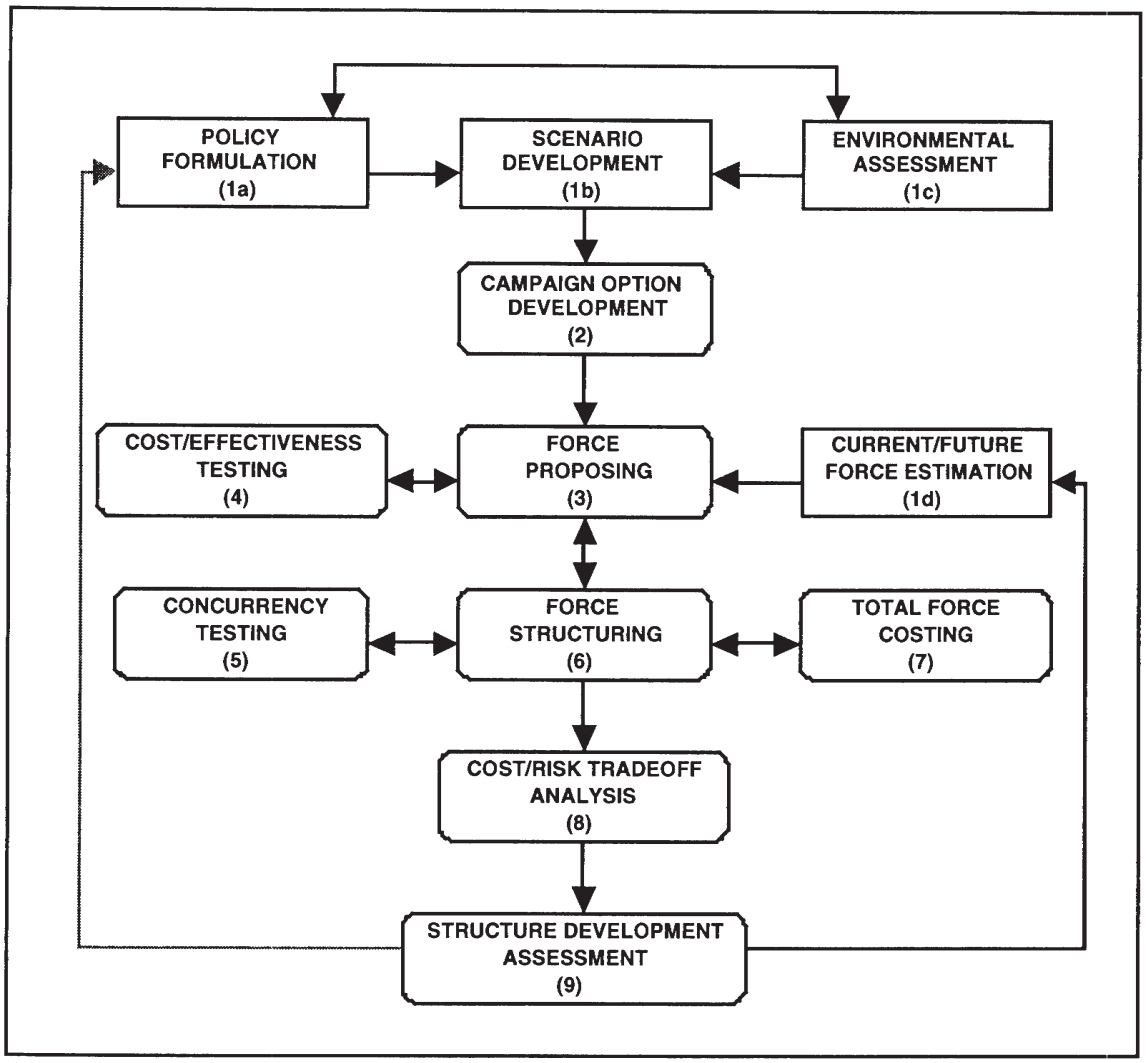
Force elements have various degrees of flexibility, but recent operational experience has indicated that forces designed for high intensity operations such as those planned for during the Cold War, are not necessarily effective in other operating environments. To deal with an increasingly complex security environment producing disparate competing demands, decision-makers need increasingly sophisticated support in the LTDP process (LTDPP). Having an extant LTDPP also allows an organisation to learn, anticipate and respond more appropriately to events as they unfold in real time, especially if the LTDPP opportunities for organisational learning are fully exploited.

The boundaries between LTDPP and short- and medium-term planning are vague. At the highest level, however, boundaries are clear; LTDP takes national security interests and objectives as inputs and typically produces sufficiently concrete ten to thirty year content in the form of force structure development plans (SDPs) as outputs. The SDPs define changes required in all aspects of military capability over time. Ideally, the objectives and required capabilities are articulated in a policy document and endorsed at the highest level. This policy document establishes the priorities for the implementation oriented medium- and short-term planning. Also, the defence objectives should be formulated in line with overall financial and other resource limitations. Hence, strategic security goals are very much inside the space provided by politically feasible SDPs, their associated costs and their calculated risks.

Scenarios are an essential element of LTDP. In fact, use of scenarios is highly correlated with a well-developed and influential LTDPP, at least in the NATO organisations and nations employing a complete long term planning process. Scenarios establish a transparent link from a general national security policy to the cost-effective force structure development outlined in the LTDP. No single scenario is likely to be broad enough to cover all eventualities and security interests, thus a portfolio of scenarios is needed.

Proposed Long Term Defence Planning Process

The 'best practice' model is the product of a critical review of the strengths and weaknesses of NATO and national processes. Although presented in terms of 'steps', the actual process is more intricate than this. Some steps may run in parallel, and the process contains feedback (the double arrows in the diagram).



Long term planning process 'best practice' model

After the scenarios have been built, taking policy goals and environmental constraints into consideration, threat scenarios are broken down into campaign options. Force packages are then proposed - consistent with mission objectives within each scenario. These force packages are then tested to ensure that they are viable and suitable for the campaign. The aim is to refine the force packages so that there is confidence that they will meet the objectives with the minimum required level of force consistent with the level of risk outlined by the policy for that particular scenario. The output is a set of ideal force packages for each scenario. These are then built up into an overall force structure taking account of i.e. concurrence, rotation, maintenance and training.

The difference between the final force structure and the current planned equipment and manpower programmes gives rise to the force structure development plan (SDP) that aligns the long term force goal with the current structure and future programmes. The initial SDP typically exceeds budgetary expectations and further refinement would be required to balance the SDP plan with expected resources.

If this “refinement” is a major iteration, it may indeed involve a full new cycle with a view to the risks involved. Revision of security and defence policy goals and/or scenarios may be needed to bring objectives and resources into balance.

Organisational and implementation issues

Most defence decisions are made by collectives of people. Decisions are tempered by an assessment of pragmatic issues, such as what will be acceptable to a wider audience, including those not explicitly stated in step 1. The LTDPP so far has attempted to provide objective advice. Yet it must also provide subjective sense to decision makers in the widest sense. This means that the LTDP designed to be objectively “optimal” must also be perceived to be so; namely the product of a well-understood process. Also the widely accepted myths and truisms need to be taken into consideration if they cannot be overcome by the plan or related processes. The guidance provided by the plan must generally be recognised as:

- Having key stakeholder support.
- Providing guidance at the right time to inform the decision-makers and their staffs.
- Providing advice that is relevant to the issues at hand.
- Proposing a range of pragmatic options with an evaluation of their benefits and risks.

The LTDP should inform, not direct, detailed implementation timings and practicalities. Delegation of decision-making in this way also empowers a wider stakeholder community. The LTDP should however be used again when auditing the resulting programme, so that its direction and viability are maintained in line with the LTDP objectives.

Manuel sur la planification de défense à long terme

(RTO TR-069 / SAS-025)

Synthèse

Introduction

Le présent manuel a pour objet d'améliorer l'établissement des plans de défense à long terme (LTDP) dans l'ensemble de la communauté de l'OTAN par le biais d'une synthèse des principes de planification appliqués par les pays et par l'OTAN. Outre sa fonction de guide à l'intention des différents utilisateurs, ce manuel sert également de cadre commun, conçu pour faciliter la communication sur les questions relatives aux LTDP au sein de l'Alliance et entre ses pays membres et les pays membres du Partenariat pour la paix. Le manuel s'intéresse à la totalité du processus d'établissement des LTDP, plutôt qu'au détail de ses mécanismes. On aborde également, dans le cadre de ce processus, le contexte de la planification et la traduction des plans en mesures exécutives.

La planification à long terme est essentielle pour les organisations confrontées à un double impact : incertitude quant à l'avenir et très peu de souplesse quant à l'utilisation des ressources. Pour l'OTAN comme pour les pays membres, la planification est devenue plus complexe après la guerre froide. La situation antérieure était en effet caractérisée par une menace dominante unique et des ajustements à court terme destinés à tirer parti des progrès technologiques et à faire face aux évolutions de la menace; telle qu'elle se présente aujourd'hui, la situation exige une approche beaucoup plus large, afin d'englober toute la gamme des défis futurs en manière de défense.

Les éléments de forces présentent des degrés de souplesse variables, mais l'expérience opérationnelle récente a montré que les forces conçues en vue d'opérations de forte intensité comme celles prévues dans les plans établis lors de la guerre froide ne sont pas nécessairement efficaces dans d'autres environnements opérationnels. Pour faire face à un environnement de sécurité de plus en plus complexe, source d'exigences disparates et concurrentes, les décideurs ont besoin d'un soutien de plus en plus sophistiqué dans le processus d'établissement des LTDP. Avoir à sa disposition un tel processus permet à une organisation d'apprendre, de prévoir et de réagir de façon plus appropriée aux événements au fur et à mesure qu'ils se produisent, en temps réel, notamment si les possibilités d'apprentissage organisationnel offertes par le processus d'établissement des LTDP sont pleinement exploitées.

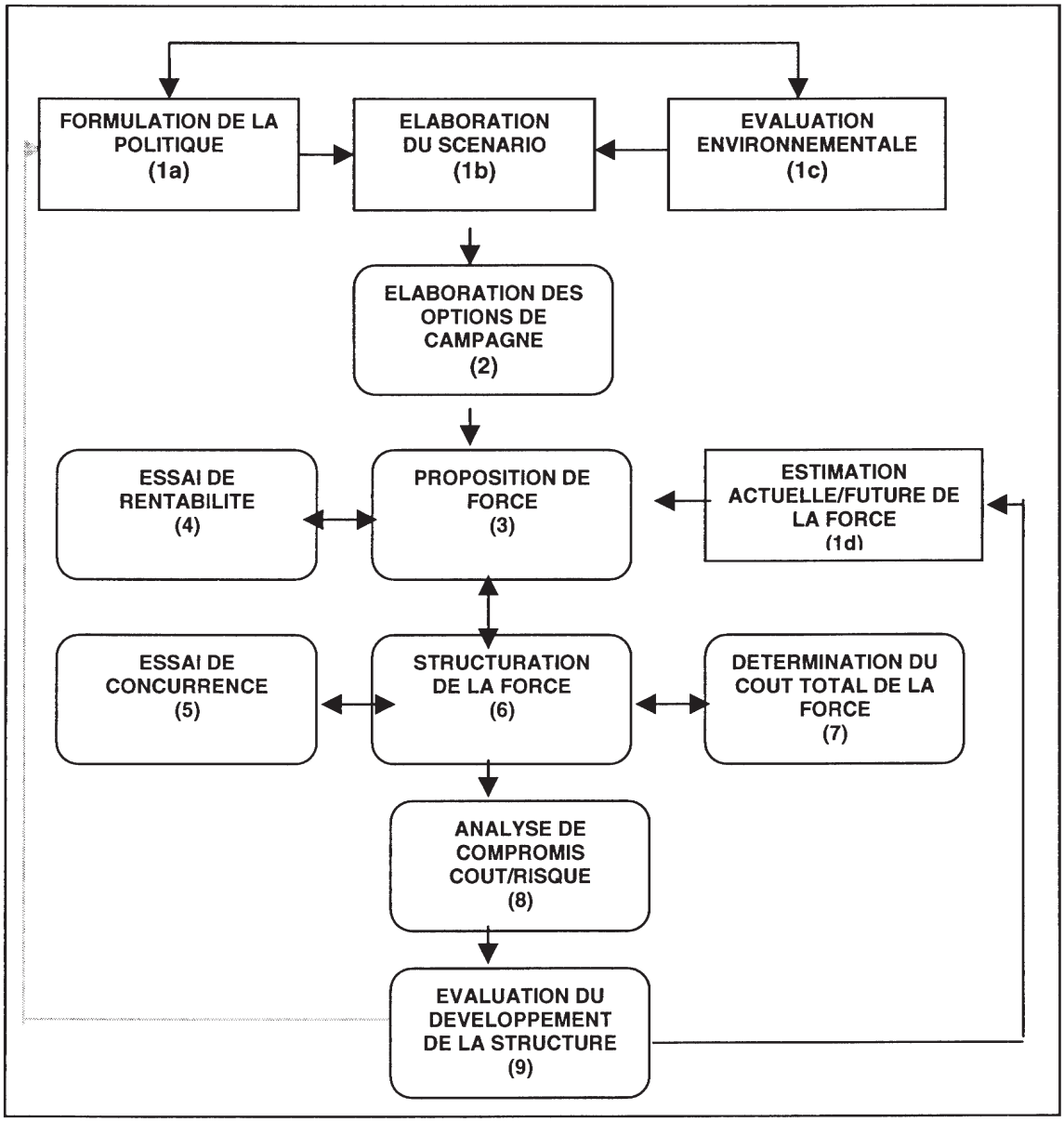
Les frontières entre le processus d'établissement des plans de défense à long terme et des plans à court et à moyen termes sont imprécises. Au plus haut niveau, cependant, ces frontières sont claires : les LTDP utilisent comme intrants les intérêts et les objectifs nationaux de sécurité, et ont pour résultat type des plans de développement de la structure de force (SDP) avec un contenu concret pour 10 à 30 ans. Les SDP définissent les changements qui, avec le temps, seront nécessaires pour tous les aspects de la capacité militaire. La situation idéale est celle où les objectifs et les capacités requises sont énoncés dans un document d'orientation entériné au plus haut niveau. Le document d'orientation définit les priorités pour les plans à moyen et court termes orientés vers la mise en œuvre. Par ailleurs, la formulation des objectifs de défense devrait tenir compte des limitations globales des ressources, financières ou autres. Par conséquent, les objectifs stratégiques de sécurité s'inscrivent très largement à l'intérieur de l'espace défini par les SDP politiquement faisables, les coûts associés et les risques calculés.

Les scénarios constituent l'un des éléments essentiels des LTDP. Il existe en fait une très forte corrélation entre le recours aux scénarios et un processus bien établi et influent d'établissement des plans de défense à long terme, du moins dans les organismes et les pays de l'OTAN utilisant un processus complet de planification à long terme. Les scénarios établissent une liaison transparente entre la politique générale en matière de sécurité nationale et le développement dans des conditions

rentables de la structure de force décrite dans les LTDP. Aucun scénario ne sera sans doute, à lui seul, assez général pour couvrir toutes les éventualités et tous les intérêts de sécurité, et il conviendra de disposer d'un portefeuille de scénarios.

Proposition de processus d'établissement des plans de défense à long terme

Le modèle correspondant aux « meilleures pratiques » est le résultat d'un examen critique des points forts et des faiblesses des processus de l'OTAN et nationaux. Bien qu'il soit présenté sous la forme « d'étapes », le processus est en réalité plus complexe qu'il n'y paraît. Certaines étapes se déroulent en parallèle, et le processus comprend des retours d'information (indiqués par des doubles flèches dans le graphique).



Modèle de « meilleure pratique » de processus de planification à long terme

Après l'élaboration des scénarios, qui prendra en compte les objectifs des politiques et les contraintes environnementales, les scénarios de la menace sont répartis en options de campagne. Des ensembles de forces, compatibles avec les objectifs de la mission pour chaque scénario, sont alors proposés. Ensuite, ces ensembles de forces sont mis à l'essai pour en déterminer la viabilité et l'adéquation à la campagne. Le but poursuivi est d'affiner les ensembles de forces afin d'acquérir la certitude qu'ils pourront répondre aux objectifs avec le niveau de force minimum requis compatible avec le niveau de

risque décrit par la politique adoptée pour un scénario particulier. Le résultat prend la forme d'ensembles de forces idéaux pour chaque scénario, qui sont ensuite regroupés en une structure globale de force tenant compte, entre autres, de la concurrence, de la rotation, de la maintenance et de la formation.

La différence entre la structure de force finale et les programmes actuellement prévus en termes de matériel et de personnel donne naissance au plan de développement de la structure de force (SDP) qui harmonise l'objectif de force à long terme, la structure actuelle et les programmes futurs. Le SDP initial excède généralement les prévisions budgétaires et doit être affiné davantage pour parvenir à un équilibre entre le SDP et les prévisions de ressources.

Si ce travail d'affinement constitue une itération de premier plan, il peut en effet impliquer un nouveau cycle complet prenant en compte les risques envisagés. Une révision des objectifs et/ou des scénarios de la politique de sécurité et de défense pourrait s'avérer nécessaire pour établir un équilibre entre les objectifs et les ressources.

Questions relatives à l'organisation et la mise en œuvre

En matière de défense, la plupart des décisions sont prises de manière collective. Elles sont nuancées par une évaluation des questions pragmatiques, comme celle de savoir ce que le public en général jugera acceptable, ainsi que celles qui ne sont pas explicitement évoquées à l'étape 1. Le processus d'établissement des plans de défense à long terme s'est efforcé jusqu'ici d'offrir des avis objectifs. Il doit aussi, toutefois, donner aux décideurs au sens le plus large une perception subjective. Autrement dit, les LTDP sont conçus de manière à être objectivement « optimaux », mais ils doivent aussi être perçus comme tels, c'est-à-dire comme le résultat d'un processus bien compris. Il faut également prendre en considération les truismes et les mythes généralement admis, si le plan ou les processus connexes ne parviennent pas à les écarter. Il doit être admis, de manière générale, que les directives fournies par le plan :

- bénéficient du soutien des principales parties concernées;
- donnent des orientations au moment opportun pour aider les décideurs et leurs états-majors à prendre les bonnes décisions;
- donnent des avis pertinents aux questions à l'ordre du jour;
- proposent un éventail d'options concrètes, assorties d'une évaluation de leurs avantages et de leurs risques.

Les LTDP devraient éclairer, mais non régir, le calendrier et les aspects pratiques des détails de la mise en œuvre. Cette forme de délégation du pouvoir de décision permet de responsabiliser un plus grand nombre de personnes concernées. Il conviendrait toutefois d'avoir une fois encore recours aux LTDP lors de l'audit du programme qui en résulte, afin que son orientation et sa viabilité demeurent conformes aux objectifs des LTDP.

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Preface

Long Term Defence Planning deals with shaping tomorrow's defence forces for an alliance or a nation. Given the significant period it takes to implement a new force structure, partly due to lengthy development and acquisition times, Long Term Defence Planning (LTDP) usually focuses ten to thirty years into the future. LTDP is a complicated process fraught with significant and perhaps dire consequences for nations. The pace of scientific and technological change and the complexities of the international security environment makes it challenging, apparently ever more so. Faced with limited defence budgets, a wide threat spectrum, and the complexities of the alliance, LTDP professionals find themselves addressing a particularly challenging task.

This project began with the assumption that there exist good ways to deal with LTDP issues, and that a common reflection upon how nations and NATO deal with these issues would benefit LTD planners. SAS-025 was set down by the NATO Research and Technology Board in the Studies, Analysis and Simulation (SAS) panel in May 1999 to review current NATO and national planning experiences in order to devise a comprehensive approach that integrates those experiences in face of new planning challenges. The SAS-025 technical team has had an evolving membership with participation from Australia, Canada, Denmark, France, Germany, Italy, NC3A, the Netherlands, Norway, USA, United Kingdom, SHAPE and Turkey.

The team has devised several questionnaires that have been used by NATO and the nations and has held five meetings to discuss the findings and compile them into (I) this Handbook with its annexes, (II) a related volume of selected Focus papers, and (III) a database of analytical planning models.

This handbook primarily presents proven ways of doing LTDP. At certain stages, however, experiences have lead to lessons identified that have not yet been implemented. This has not prevented us from arguing such implementations. There is no illusion that the LTDP process could be made routine and that the need for experience-based judgement could be made unnecessary. However, there is an abiding belief that the process can be made better, stronger, and that we can all learn in the process by talking with others grappling with the same issues.

This handbook is meant to serve the novice and experienced planner alike. It is our view, based on both national and NATO experiences that Long term Planners will be well served by it. We also hope that the Handbook will serve as a first in a series of efforts to better link together the LTDP communities within NATO and perhaps with others as well.

For RTO SAS-025 Technical Team On "Overall Long Term Defence Planning",

Dr. Bent Erik Bakken
Team Leader

CHAPTER 1

INTRODUCTION

1.1 Background and Purpose

Long term planning (LTP) is essential to organisations facing the impact of uncertainty of the future and little flexibility with regards to resource employment. For NATO and nations, planning has become more complex after the Cold War. From a planning characterised by a single dominant threat and short-term adjustments to capitalise on new technology and to counter threat developments, the situation of today calls for a much broader approach to embrace the diversity of future defence challenges.

Long term Defence Planning (LTDP) deals with shaping tomorrow's defence forces for an alliance or a nation. Given the significant period it takes to implement a new force structure, partly due to lengthy development and acquisition times, LTDP usually focuses ten to thirty years into the future. LTDP is a complicated process fraught with significant and perhaps dire consequences for nations. The pace of scientific and technological change and the complexities of the international environment makes it challenging, apparently ever more so. Faced with limited defence budgets, a wide threat spectrum, and the complexities of the Alliance, LTDP professionals find themselves addressing a particularly challenging task.

To deal with an increasingly complex security environment producing disparate competing demands, decision-makers need increasingly sophisticated support in the LTDP process (LTDPP). Having an extant LTDPP also allows an organisation learn to anticipate and respond more appropriately to events as they unfold in real time, especially if the LTDPP opportunities for organisational learning are fully exploited.

This handbook primarily presents proven ways of doing LTDP. At certain stages, however, current negative experiences have lead to lessons learned that have not been implemented yet. This has not prevented us from arguing such implementations in this handbook. There is no illusion that the LTDP process could be made routine and that the need for experience-based judgement could be made unnecessary. However, there is an abiding belief that the process can be made better, stronger, and that we can all learn in the process by talking with others grappling with the same issues.

1.2 Audience

The primary audiences for this handbook are supporting analysts, those overseeing the long term planning process and those deciding upon and/or implementing the resulting plans.

This handbook is meant to serve the novice and experienced planner alike. It is our view, from both national and Alliance experiences that Long term Planners will be well served by it. Hopefully, the handbook would spur a series of efforts to better link together the LTDP communities within NATO and perhaps with others as well.

1.3 Scope

The focus of this handbook is the *process* and interconnections of long term planning, rather than the details within that process. The handbook also addresses the planning context, namely strategic defence policy making, as well as the organisation in which that planning takes place.

The ‘best practice’ principles described in this document may be used as a gauge for NATO and national processes. Although each national long term planning process has unique features, it is certainly not the case that any approach is as good as any other. Terminology, emphasis, and the particular arrangement and elaboration of process elements may differ within each nation, but any ‘state-of-the-art’ long term planning process should to a large extent reflect the ‘best practice’ principles described here. This acknowledgement forms the very basis for the existence and value of this handbook.

CHAPTER 2

LONG TERM DEFENCE PLANNING DEFINITION AND APPROACHES

Definition

Long term defence planning is a process that investigates possible future operating environments and develops a force structure development plan (SDP) to best adapt the defence organisation to those environments given a host of constraints – including financial ones.

The time period associated with 'Long term' depends on how long it takes to make changes and varies for each defence sector. Major new materiel developments and investments, and implementation of new capabilities, competencies as well as structural changes, all take long time. Consequently, the appropriate long term time horizon is 10-30 years. There are exceptions to that rule, notably the fact that no integral NATO planning process looks further ahead than six to eight years.

A carefully designed long term defence planning process (LTDPP) ensures cohesion across various and shorter planning horizons and sub-disciplines, so as to achieve overall force cost-effectiveness over the long term. An important LTDPP side effect is that it gives the organisation an opportunity to reflect about the future. Consequently, it improves the organisation's ability to anticipate and respond more appropriately to events as they unfold, especially if organisational learning and participation have been emphasised throughout.

Different angles on long term planning

Different general approaches have been applied to this complex area over the years. The analyst would prefer complementing approaches, but these approaches significantly overlap both in what aspect of the planning issues are important and their impact on the underlying process. Each approach is holistic and capable of underpinning the entirety of the process:

<u>Focus: The planning process</u>

Top-down planning.

- This is a "strategy to tasks" approach to planning. The process begins with the specification of top-level policy, interests and objectives. Strategies are developed that support overall policy and objectives. This approach is then cascaded down through lower levels.

Resource-constrained planning.

- The objective of this planning approach is to provide a viable capability that is sustainable within the provided budget. No effort is made to investigate force structure options that are more expensive, regardless of the potential performance jumps such budget violations might incur.

<u>Focus: Degree of technology optimism versus historically proven facts</u>

Technology optimism.

- A key development goal is to obtain operational and strategic superiority through technology. Force structure development is carried out so as to fully exploit technology.

Risk avoidance.

- Proven concepts and structures are extrapolated and extended. This approach continues current ways as long as they are deemed successful. Consequently the approach maintains the status quo.

Incremental planning.

- Existing capabilities form the foundation of new capabilities. Initiated changes attempt to evolve these capabilities with well-known improvements. The exploitation of near-term developments and options are central. Incremental planning is an instance of a risk avoidance approach.

Historical extension.

- Similar to incremental planning, the basic premise is that what worked in the past will work again in the future. Analysis of future operational effectiveness of various options is based on a historical analysis. Past operations are evaluated to identify the factors that most significantly contributed to success and/or failure. The future force structure is then designed to take greatest advantage of the positive factors while avoiding the negative ones.

Focus: Functions or concrete scenarios as the driver for measuring performance

Capability-based planning.

- This method involves a functional analysis of expected future operations. The future operations themselves do not enter the performance evaluations. The outcome of such planning is not concrete weapons systems and manning levels, but a description of the tasks force structure units should be able to perform expressed in capability terms. Once the capability inventory is defined, the most cost-effective and efficient physical force unit options to implement these capabilities are derived. However, the evaluation of physical force unit options is not a part of the LTDPP.

Scenario-based planning.

- This approach utilises a representative set of situations for the employment of forces. The situations are specified in terms of environmental and operational parameters and form the test bed for assessing capability or system requirements against formulated mission objectives.

Threat-based planning.

- The threat-based approach involves identifying potential adversaries and evaluating their capabilities. Capability or system requirements are based on the criterion of out-performing the opposition. Quantitative and qualitative solutions are explored. This was the common planning approach during the Cold War. It differs only from scenario-based planning in that humanitarian and other non-threat scenarios are excluded from the scenario set.

Two approaches seem to be prevalent throughout the defence planning community: resource consciousness (a milder form of resource-constrained planning) and scenario-based planning. This is both clear from the discussion in chapter 3 on the LTP in perspective and from the long term planning process ‘best practice’ model described in chapter 4.

CHAPTER 3

THE PLANNING CONTEXT

3.1 Introduction

This chapter provides the context for long term defence planning. The sequence of the chapter mirrors the sequence of LTDP: Security interests define defence goals as a part of the defence policy development. The LTDP transforms the defence policy to a defence concept and a planned force structure and provides input to the medium- and short term planning. The LTDPP is hence the link between the defence policy and medium and short-term planning activities.

3.2 The Overall Context

Long term defence planning is but one component of the overall defence planning context. As such, it must accept input from and provide outputs to other processes. The relations within the defence planning process are shown in Figure 1. The rectangle indicates the entire context, while the "hat" outlines LTDP.

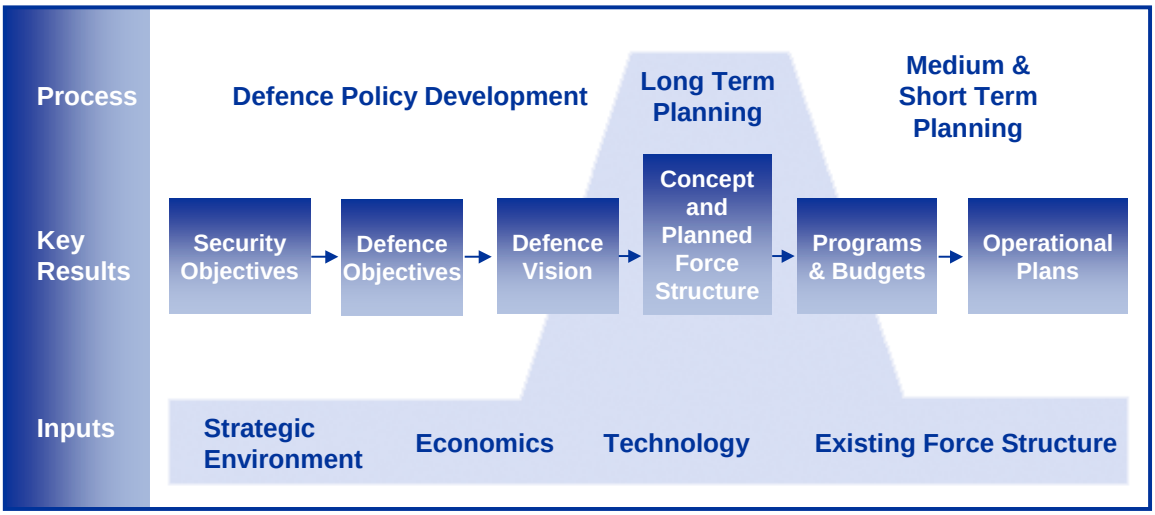

Figure 1: Long term defence planning and its context

The overall process starts with the desires of the nation to uphold and promote its values and interests. It then identifies how defence will contribute in achieving these desires, and generates defence forces capable of achieving defence objectives, subject to economic and other constraints. The process has many feedback loops allowing reverse causality; e.g. new force concepts influencing on defence policy development and existing programs influencing on the (new) planned force structure.

As indicated by the "splitting" of Defence Vision and Programs and Budgets, these are activities where the LTDPP converts broad categories of goals into operational tools for force structuring (left hand side) and turns broad force concepts into a concrete structure development plan, i.e. a first cut of Programs and long term Budgets (right hand side).

The following discussion provides a more detailed look into the two adjacent processes to LTDPP; Defence Policy Development and implementation of an SDP into Medium- and Short-Term Plans.

3.3 Planning Boundaries ("inputs")

3.3.1 Policy Guidelines On The Strategic Environment

A clearly formulated and unequivocal defence policy bounds the LTDPP. The clearer security priorities are stated, the more efficient the LTDPP can be executed. Unfortunately, the nature of the world and politics makes defence policy often vague - only in the specifics of scenarios is it possible to obtain the desired clarity.

Regardless, the defence policy begins with an assessment of possible future strategic environments and then links this strategic appreciation to the national desire to protect and promote its citizens, territory, vital interests and values. In establishing this link, the policy identifies the responsibilities and expectations to be placed on defence.

Defence of a nation's – or alliance – homeland territory and citizens is often the first defence priority. The defence policy consequently maps out anticipated threats. This assessment may include the concrete description of potential adversaries. Furthermore, objectives for the homeland defence and national crisis response operations to these challenges are described.

The policy is also be concerned with the capabilities to achieve a nation's broader security objectives giving direction as to force objectives, roles and responsibilities in out-of-area operations. The policy is often be less explicit about the military involvement outside boundaries of permanent national or alliance responsibility. Still, potential adversaries, world regions, the nature of potential conflicts/operations in which the defence forces could be involved are typically sketched out. Also, the purpose of applying national defence forces in such scenarios is discussed. Furthermore, the policy guides on collective defence arrangements and indicate national responsibilities within such agreements as well as addressing scales of effort that might be committed to various operations, assumptions on alliance or coalition partners and concurrency of operations to be undertaken.

3.3.2 Planning Scenarios

Scenarios provide focus and detail against which issues can be explored and assessed. They facilitate the transformation of policy guidelines and corresponding defence challenges into a LTDP-format that can be used for assessing proposed concepts and force structure options. Scenarios do not predict the future but address variables and their interactions in a tangible and comprehensible picture of plausible futures. Prediction, on the other hand, is aimed at forecasting a specific future. The use of scenarios provide a vehicle for communal reflection and consequent organisational learning through sharing of thought processes and creative ideas.

Scenario-based analysis considers multiple scenarios, as the complex nature of military missions cannot be addressed with any single scenario. The analyst must balance limited analytical resources with the need for a large scenario set. Therefore, scenario selection is a critical activity.

The scenario selection must be conducted with a view to capturing the full spectrum of potential future missions, the hierarchy of operations, and the range of objectives and interests. The resulting scenario set must be representative of the security challenges outlined in the defence policy. Further, for the results of the analysis to be acceptable those scenarios must be credible through formal or other appropriate approval.

3.3.3 Economics

The size of future budgets is another key input (or constraint) to LTDP. The defence budget determines the size of the defence force, the level of technology that can be implemented in the force and the level of readiness that can be maintained by the force.

In a long term perspective, short- and medium term programmes based on unrealistically high funding assumptions would accumulate structural imbalances leading to undesired capability gaps. The risk of investing in capabilities to be partly implemented or unsustainable in a longer-term perspective would be significant. The same negative impact could also occur when the costs of implementing structural

goals have been underestimated followed by insufficient budget compensation. Hence, LTDP needs to balance defence expenditures with assumptions about future defence budgets.

Given the uncertainty of forecasting the defence budget development over a 10-30 year timeframe, plans must consider robustness to changes in budget levels. If future budget levels are uncertain, a long term defence force structure with robustness to resource variations may indeed be preferable to one achieving the best operational effectiveness, but critically dependent on a high and stable funding level.

3.3.4 Technology

The technology dimension influences the LTPD in three ways. First, the technology development provides opportunities for new defence capabilities. Second, the technology development generates threats by providing potential adversaries with new capabilities. Technology change embedded in new operational concepts can radically shift the balance of force effectiveness between potential military adversaries as well among the candidates for capabilities within a nation's force structure. This shifting balance may be gradual or dramatic, providing opportunities for significant cost and effectiveness benefits or risks such as the obsolescence of components of the defence forces.

Finally, the technology development generates structural interoperability requirements depending on the degree of jointness within national defence forces, the Alliance, and/or a coalition force.

Given its importance, an assessment of technology development is an integral component of long term defence planning. A forecast of both trends and potential step-changes in technology are major assumptions into the cost-effectiveness of various defence capabilities, but such evaluations are a major part of the LTDPP itself – not an external input to it.

3.3.5 Existing Force Structure And Contracted Programmes

Military equipment typically remains in service for decades. Likewise, there are usually lengthy lead times involved in establishing programmes that ultimately bring new equipment into service. Thus, it is crucial that long term planning takes into account the current force structure and the current or agreed-upon defence programmes.

The defence planning process is a phased activity. As such, the concepts defined by the long term planning process will evolve over the next phases; medium and short-term acquisition, training and budgeting as well planning to employ existing resources in operations. Defence development and procurement programmes will typically appear out of phase after a long term planning cycle. The previous goals may be obsolete and so current acquisition programmes abolished - even in the midst of procuring systems. Of course, the SDP has already been developed with a view to the expected costs and benefits of about-to-be and in-service units in the selected future scenarios.

The stopping of ongoing programmes can be treated as a consequence of prior LTDP not having taken seriously enough robustness to a changing environment. On the other hand, there is always a risk that any cost-effective component looses its role when the associated costs and benefits change as the result of unforeseen events. The calculation of this risk is a major part of the uncertainty evaluation that is at the heart of the LTDPP.

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CHAPTER 4

BEST PRACTICE IN LONG TERM DEFENCE PLANNING

4.1 Introduction

In this chapter, activities required for a well-developed long term planning process are described. The suggestion for dealing with these activities and their interactions are based on a review of how LTDP is carried out in various NATO nations and bodies. The 'best practice' process model used here also forms the structure by which the analytical model support (techniques, methods, models and tools) in Annex 2 is presented.

4.2 'Best Practice' Model

Figure 2 below shows the model, and its steps are described further.

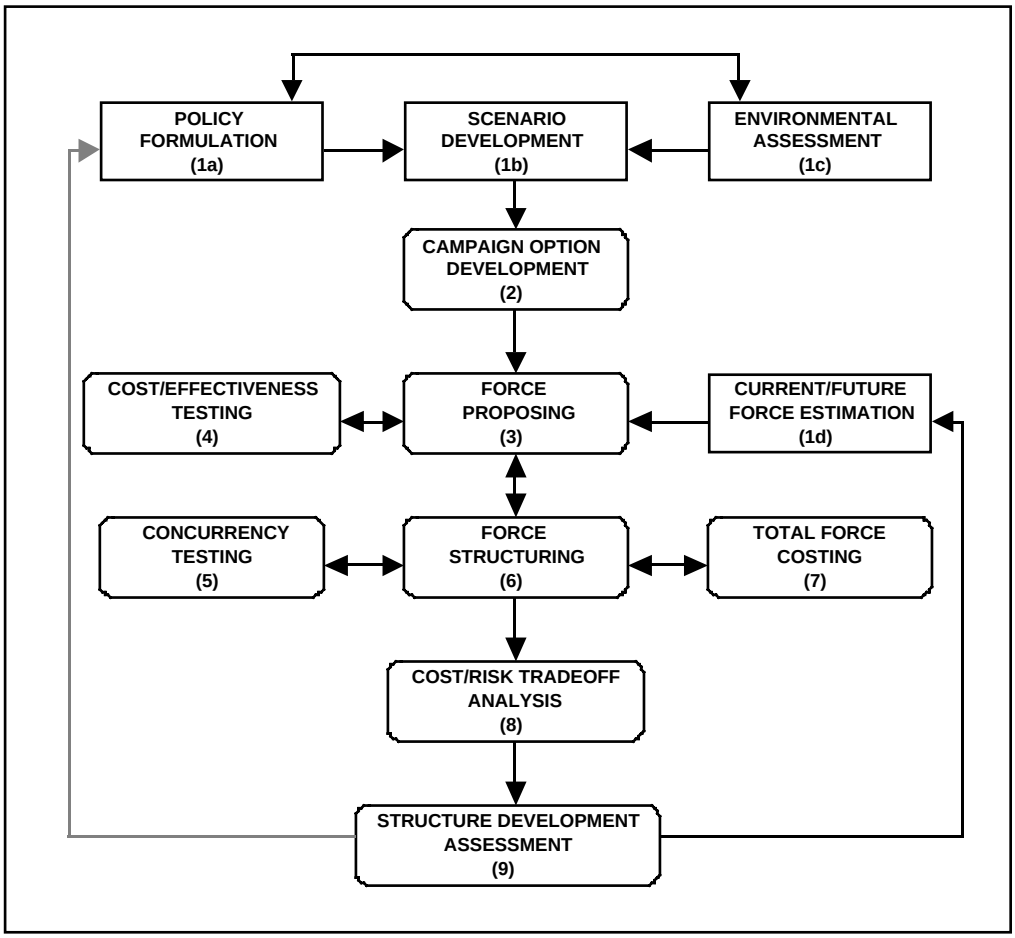

Figure 2: Long term planning process 'best practice' model

Step 1: Inputs

As mentioned in section 3.3.1, a defence policy may not exist in a way sufficiently clear for LTP. If so, the LTDPP must develop one. A second essential element is to have a policy-consistent scenario set representing situations in which the forces might be used. A sufficient variety of scenarios must be developed so that although no single scenario may actually occur, future missions can be envisaged as composites constructed from elements in the scenario set. This makes the process robust to shortcomings in any one scenario. Furthermore, all the points given in section 3.3 are of importance here and must be clarified as much as possible before the real LTDPP can begin. Annex 1 deals with design of an appropriate scenario set.

Step 2: Campaign options

A campaign plan requires a sufficiently detailed description of a specific scenario. The objectives, aims and missions of the opponents within a scenario are assessed and clarified. Especially within non-warfighting operations, the opponents' specific roles and his/their "rules of engagement" (ROE) will need to be well understood. This is very much akin to the real life situation where staff needs to get more and more detail of an operation as it progresses. The detailing must remain consistent with the original scenario and not undermine its basic structure and link back to policy. An important part is assessing the opponent's possible courses of actions (COAs). Also apparently perverse courses of action for may need to be examined, especially if there is asymmetry or terrorism involved.

The build-up of the campaign plan for an opponent can be sequenced through a series of levels as in actual operations and will need to take account of existing and future doctrine. The levels represented will depend on the resources devoted to the long term planning procedure. Grand strategic, joint, component and lower levels can all be represented.

Though it often is desirable to investigate all of the opponents' feasible COAs, time and study resource constraints prevent that. A short cut is to review a wider range of COAs to see whether they would have changed the performance of any of our own options. Often it is advisable to assess a wider range of different scenarios, rather than trying to cover many enemy COAs and own options within a limited scenario set.

With the broad campaigns defined, *our* implied tasks need to be determined by successively decomposing the scenario until the tasks of *our* individual force elements are defined. For instance, parts of the terrain may have rivers that may require engineers to bridge them.

Step 3: Force packages

The force packages coming out of step 3 are the best initial guess – a starting point – of the eventual force structure design emanating successively from the steps 4 through 10. The aim here is to obtain the minimum force package needed to achieve success in the chosen scenario, given the opponents' options, with an acceptable level of risk. Most of the iterations ensuring "optimality" of the force structure however take place in step 4.

The initial force package for each adversarial campaign option can be designed using military judgement, a series of rules or by modelling. In most cases it will be a mixture of these approaches. The entire range of force elements need not be formulated for all scenarios. But the entire force structure need to be tested in a sufficient number of scenarios. It is indeed rare that any one scenario, credible enough to withstand scrutiny, can be found to justify all elements. In smaller scale operations, only a portion of a unit may be required and some of these elements may not be large enough to be viable within the normal peacetime organisation. This may be corrected at later stages in the process.

Designing the initial logistics and support elements is often cumbersome part of the force packaging. For one, the operations themselves are not specified with a sufficient regard to support design issues. Moreover, data are often scarce on logistics needs.

Step 4: Cost/Effectiveness testing

This step involves the "optimisation" of the force packages. Sometimes, this involves optimisation in the mathematical sense, more often it is an iterative process testing and refining the packages in light of each scenario and over all of them. This step typically also involves sensitivity testing against a range of possible uncertainties in threat, environment and alliance capabilities.

Testing and refining the packages is the analysts' focus of effort – and no different than any Operations Research effort, though more comprehensive; high quality project management is important. The analyst should be aware of several important points. Firstly, wherever possible analysis should be based on objective data and auditable, quantitative processes. Where subjective (expert) judgement is used instead, it should be clearly identified as such. Secondly, over-reliance on a particular technique or model for scenario analysis is to be discouraged, instead a mix of approaches and excursions is more likely to produce high quality results.

The analyses may produce vast quantities of data that will overwhelm the best analyst unless the effort is well focussed and managed. Emerging issues or problems must not be cast aside and great care should be taken to keep the process focussed on the end goal.

Problems uncovered in the later stages may call into question work in the earlier ones so it is strongly recommended that a rapid run through the whole process is carried out leaving the more comprehensive testing until later. A quick first run-through also allows many of the critical factors to be indicated and to which attention later needs to be paid. Here, sensitivity testing help determine constraints and assumptions most affecting outcomes. Such testing can provide very powerful early feedback to policy (not explicitly shown in figure 2). For example, an agreement with a particular country may lead to a lesser force requirement in a given scenario – the alliance partner may do most of the job. When the value of such an agreement is better understood it might be possible to reorient foreign policy efforts to better serve a state's needs.

The testing can be done stepwise to reflect available methods and importance of issues. Force generation, front line force capability, sustainment, deployment and the quality of command and decision making must be investigated – preferably in well defined phases – starting with frontline force capability. Below we start the description with the chronology of an operation, i.e. force generation followed by deployment, operations in theatre, sustainability and command quality.

Force generation

A fully functional force package in a theatre is so because the units and people have been trained and materiel acquired and well maintained; the force has been generated. Testing the quality of force generation is rarely trivial: Units must have appropriate readiness profiles; their training programme must match the needs of the operation; this programme must not conflict with the training needs of other units and equipment operable. The data requirements to asses these factors are different from those required for assessing the fighting capability – more resembling civilian production processes and quality improvement. Although for many missions there may be few problems, for others the analysis can highlight clashes that can frequently be overcome by a reallocation of forces, a change in the training process or better procedures.

Deployment

Sizeable homeland and expeditionary operations pose deployment challenges. The right operational force mix should be available at right place at the right time. When operations eventually materialize, the forces actually deployed will be a compromise with the early forces having to accept a higher degree of risk. Logistics and support forces usually account for most of the required lift into a theatre and so good estimates of the relationship between front line and support quantities are needed. Standard support packages are sometimes evoked, but these are not normally efficient, as they require substantial augmentation in the theatre to prevent shortcomings. This will pose a serious risk. Alternatively, the support package must contain a redundancy that will be expensive to lift. The

assessment should consider concurrent movements by sea, air and overland, taking account of bottlenecks (e.g. at points of disembarkation) also in more complex alliance logistics operations.

Performance in theatre

Assessing the ability of forces to meet the objectives of a warfighting scenario is a traditional role of operations research and little needs to be explained here. Analysis of non-warfighting cases is a less mature area of analysis and is at present restricted to troops to task assessments and examination of vignettes, although good progress is being made at developing simulations and other tools at various levels.

Sustainability and rotation

One of the most important determinants of the success of a force is the continuous provision of logistics. It is important to assess both the logistics structure and the stocks, including levels of host-nation support. As a minimum these assessments should address personnel support including food, water, shelter, medical treatment and services; equipment support including ammunition; Petrol, Oil and Lubricants; recovery and repair; and spares and maintenance. Existing NATO planning guidelines are inadequate for many operations and must be augmented by data drawn from other sources such as those achieved as a by-product when analysing other steps in the planning and operations chronology sequence.

Concentrating on the immediate needs of a mission such as getting the required forces into a theatre and maintaining them there underestimates the needed force size. Except perhaps in homeland defence operations, personnel will not be kept in theatre for extended periods. They will need to spend a proportion of their time at home to recover and train. The exact ratio of in theatre to total force size will depend on force specifics; A country specialising in peacekeeping with deployable conscripts that are subject to "natural rotation" may require a smaller total/operative ratio than one maintaining a fully professional and steady force.

Similar issues arise with equipment. Some may be sustained in a theatre for long periods, but sophisticated items may require long term maintenance at a home base. For systems like aircrafts there will often be a need to balance utilisation across the fleet. The time journeying to and from theatre can account for a significant proportion of the time away from base and needs to be included in any analysis.

A multiple of two to six of the forces in theatre may be required in total. Although analysis can take the form of simple ratios, how these are derived is very important. Changes in such factors can far outweigh those in the forces required in theatre. Herein lies a data challenge; should current empirical ratios be used for calculations, or should the process assume other ratios, perhaps to reflect probable higher productivities. Conversely, are current ratios too low, resources would be strained causing manpower to be over-stretched and equipment to be worn out earlier than economically optimal.

Command and Information

Having assessed force generation, deployment, performance in theatre and sustainability, a check needs to be made that these processes would not have been unduly constrained by lack of information, information processing and/or the limitations of communications. Analytical methods to conduct detailed assessments of these issues are only just coming into use.

Step 5: Concurrency testing

The discussion so far has assumed that scenarios occur one at a time, without concurrency. However, operations theatres may well need to be served in parallel. Here, two extreme approaches may serve to illustrate how concurrency testing may be carried out. One is to regard any scenario as independent. The requirements derived from a scenario should then be integrated into a requirement for a total force structure. Of course this approach leads to an under-specification of force structure needs if two or more operations were to be carried out in parallel. The argument for this simplistic

approach is that (minor) operations will be served to the extent possible using whatever remaining forces are deemed available – the force structure is designed with the major (force structure driving-) scenario(s) in mind. This corresponds to weighing the other (minor) concurrent scenarios with a factor close to 0.

The other approach integrates all scenarios active at any point in time into a "higher order" scenario and derives requirements from the sum of concurrent scenarios. This corresponds to weighing all scenarios equally. In reality, the concurrency analysis mixes these two extreme approaches.

The concurrency analysis needs to examine a wide combination of scenarios and tasks. Many may not be demanding warfighting ones. Decisions will need to be made of how important these tasks are relative to others as forces may sometimes be subtracted from low priority ones to partake in more vital missions. A single combination of scenarios is unlikely to require the maximum level of every force element. Different combinations will stress different elements and many cases will need to be examined to ensure that the maximum requirements for each force element are found. The process is relatively mechanical and computer models can reduce the effort.

Taking concurrency into consideration, and summing up initial force package "optimised" for each scenario, substitution should be reconsidered. For instance, infantry forces may have been allocated to every scenario and it may appear that very large numbers are required. But in some of the missions, such as peacekeeping, it may be acceptable to use other troops such as cavalry – even though cavalry forces may be less cost/effective for that scenario seen in isolation. Other examples are the use of attack helicopters in place of attack aircraft and naval gunfire support in place of artillery. The validity of the substitutions will depend on the scenario, the training of the forces and the risk that may be taken. Again the analysis can be reduced to a set of programmed rules but a final manual rationality check will be required of the substitutions made by the program.

Step 6: Force structuring

A cost/effective "optimal" force structure able to meet the needs of all the scenarios, concurrent operations, rotation and manpower limitations has been calculated in the steps above. However, manning and capability numbers derived from the operational scenarios typically need to be adjusted upwards to allow for force production requirements; training, repair and peacetime attrition. The associated weapon, ammunition and other stockpiles may need to be estimated, and infrastructure needs to be examined. The total force pool is then the summation of requirements deriving from the operational scenarios, including concurrency issues, adjusted upwards for force production issues. Once this has been done, total force structure costs may be calculated.

Step 7: Total force costing

Costing is done at several steps. When designing candidate force packages in step 3 for further "optimisation" in step 4, costs was an implicit or explicit factor. Step 4, of course, entails cost/effectiveness evaluations in order to ensure that chosen force packages are the cheapest way to succeed in a scenario.

Yet in step 7 total force structure costs are assessed in the long term perspective. This is done to ensure that the entire force structure is within the budget constraint in step 1. A resource limit has informed the security goals and thus the force package design implicitly. But also explicitly affordability influence structure design before this step. For example, a small nation does not consider building a strategic nuclear force due to cost reasons – regardless of security concerns.

Total force structure costing can be done in two different ways: By discounting all costs back to a common start year through e.g. the Equivalent Annual Cost (EAC) method. This is similar to the discounted cash-flow (DCF) analysis used for commercial investments. The other method not only produces a cash flow that in sum over 10 to 30 years is in line with budget assumptions, but also makes sure that the budget constraint is upheld for any one year in the period.

EAC is the simpler of the two, and in line with its DCF ancestry uses an interest rate deflator to make certain that outlays appearing in the near and far future are commensurable. However, most nations have budget constraints for all years – not for the long term period as such. Hence EAC may well end up with a force structure that is not affordable for many of the intervening years.

In order to ensure single year affordability, the SDP (which specifies the total force structure for all the years in the period) cost is calculated for all years. This approach then must make first order assumptions about and indeed adjust programming to ensure affordability. Hence this method ventures further into the right hand side of figure 2 than does EAC. This has the added benefit of making the LTP better prepared for medium term planning – but also the added effort of doing so.

Step 8: Risk/cost tradeoffs

At this stage, the cheapest force structure required to meet aspirations has been derived. It may however well be that it is not affordable; the policy goals and the budget constraint cannot both be met. Now this dilemma needs to be made explicit – what options exist with regard to reducing the level of ambition of in the policy goals? The cost/effectiveness analysis in step 4 has already produced performance tables and graphs. These show performance as a function of force package content and costs. Uncertainty in these estimates should also have been made explicit in qualitative and quantitative form. It is now possible to reduce costs by reducing holdings of some force structure elements. The resulting reduced performance (i.e. the increased risk) should be clarified and synthesised using the existing calculations. Costs can be reduced by increasing risk within each scenario, but also by deleting scenarios (i.e. missions).

The deletion of scenarios and correspondingly accepting higher risks is not something defence planners can do in isolation; it is the heart of defence policy-making. On the other hand, such tradeoffs also point to the grey areas of responsibility between planning and policy. The planner should be cautious not to bypass policy makers by trying to put him/herself into the policy maker's shoes. Arrogance in the planning community may violate the credibility of the LTDPP. Yet, good planner judgement is key since the number of possible options in the unsolved risk gap is limitless. Just passing the endless list of option to policy-makers is not fruitful. The options need to be reduced and clarified; the most useful planner is one that is creative and analytic and puts a sufficient and relevant option set in front of the policy maker for further reduction.

Uncertainty should be captured throughout the analysis process. Documenting risks should be foremost at this point rather than at the earlier stage of assumptions and constraints, since it is here that the focus of the uncertainty discussion can be limited to specific key force drivers and planning alternatives. Otherwise the uncertainty analysis becomes practically infinite in its complexity and therefore of little use.

Step 9: Structure development assessment

At this stage, the obvious non-options from step 8 have been weeded out. In step 8, the tradeoffs are made clear and step 9 the planner's recommended force structure is presented. For the areas where there exist inconsistencies, the options are presented clearly. With respect to the recommended structure, it is presented in the form of a structure development plan where organisational units and consequent investments and major competence building programmes are made explicit. The LTP's level of detail must be sufficient to allow a discussion on major programmes, yet be formulated so that excessive detail is left out. Medium and shorter term planning should take care of that.

Step 10: Feedback

The long term planning process is both an iterative sequence and bi-directional . Ultimately, there is feedback between the end product of the long term defence planning process and the policy goals and constraints. However, there is also continuous feedback between and within all steps. Thus scenarios inform constraints which in turn incorporate uncertainty, which in turn generate alternatives and so forth in a happy bubbling caldron of analysis. However, it is critical that this process be disciplined and timely.

4.3 Process Issues

Defence planning is typically performed periodically, but parts of the process may also be started out of sequence. Steps are revisited when the need arises, for instance when a major shift in the environment takes place (the next government, a crisis situation, a new treaty). Other stages of the defence planning process are executed periodically, and some are dealt with on a permanent basis. Typically, the first option applies to the defence policy component, the second to long term planning, and the third to the force implementation and management part.

In the whole fabric of activities running next to one another, a number of 'synchronisation points' are defined in order to transfer information up and down the chain. Synchronisation is often achieved through the issuing of a planning document. Top-down synchronisation is often institutionalised, bottom-up feedback less so.

Not all analysis teams will be able to cover all stages but the process does lend itself to streamlining. The whole cycle, covering all aspects, may require an average team of 10 to 15 experienced staff for about 12 months for a smaller nation. An abbreviated version, contracting many of the stages, has been successfully carried out with a similar size team in an intensive period of about 6 weeks. Little development time of the process may be needed for the rapid run-through but may simply call on those tools which are available and using judgement where time or resources does not permit otherwise. The development time for initiating a fully developed integrated process with all stages covered and all data sources identified and models developed can take several iterations over several years.

The long term planning process need not concentrate on a single one time horizon but may differ between defence sectors: those for manpower planning may be a few years while those for fast-jets may be many decades. Once the process is operational it is not too difficult to cover several periods, since much of the data will be the same.

The essence of the long term defence planning process is to focus on key force drivers, broad conclusions and concrete force structure capabilities. The detailed analysis required when evaluating the exact nature of capability implementation and large expenditures can be left to later. Too many planning alternatives can bury the planner in details making the overall effort large and unresponsive.

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CHAPTER 5

ORGANISATIONAL AND IMPLEMENTATION ISSUES

5.1 Introduction

The previous chapters have addressed the policy background and analytical process of long term defence planning from a planning practitioner's point-of-view. This chapter discusses the attributes required of both process and product of long term planning if they are to influence decision-making.

The advice below assumes a planning process with short-, and medium- in addition to long term planning.

5.2 Organisational acceptance

Defence decisions must be tempered by an assessment of pragmatic issues. This will contribute to convincing a sufficiently wide community of stakeholders about the soundness of its logic and conclusions. This again requires the LTDPP to be transparent. The LTP should also be formulated so that it:

- Guides at the right time.
- Is relevant to the issues at hand.
- Proposes a range of pragmatic options with an evaluation of their benefits and risks.

In order to facilitate this perception of timeliness, relevance and pertinence it is important that stakeholders share 'ownership' of the long term plan with the planning community. This is best achieved by scheduled opportunities for interaction throughout the planning process. Typical opportunities for such interaction between the planning community and others during the process occur at the following points:

- Agreeing on the directive(s) to the planning staff and therefore acknowledging the need for change [decision-makers].
- Staffing and endorsement of the assumptions and objectives (at an early stage of the process) [decision-makers & key stakeholders].
- Stakeholder participation during the force-package estimation step of the process [key stakeholders].
- Reviewing intermediate outputs and directing additional analysis [decision-makers & key stakeholders].
- Co-ordination of the final output of the long term planning process [decision-makers & key stakeholders].
- Translating the long term planning output into policy guidance on capability balance; in particular to provide direction for medium and short-term planning [decision-makers].

5.3 Transformation into decisions

Seen from the decision-makers perspective, the output of the long term planning process is a small set of internally and externally consistent and resource balanced force structure development plans (SDPs). These describe how defence capabilities and supporting manpower, equipment, infrastructure etc. evolve over time. Typically a LTP is articulated in a policy document and endorsed at the highest level (e.g. Defence programme projection (US) / Future capability requirements (UK)/ Planning and programming law (FR)). Such a policy document sets the SDP in perspective and formulates it in sufficient detail for use in policy decision-making and consequent shorter term planning.

Long term planning is carried out under one or more assumptions about future budgetary constraints. To the extent that the SDP has not been balanced budget-wise for each year, it must identify potential overheating[1] in programmes or shortfalls in defence capabilities. It may well suggest solutions to such overheating, or relay such questions to medium-term planning.

[1] Where deferred procurements cause a bow-wave that exceeds the budgetary provision in later years (i.e. beyond the medium-term horizon).

CHAPTER 6

KEY INSIGHTS & RECOMMENDATIONS

6.1 Key insights

This handbook has been based upon extensive experience across the NATO defence planning community. As a result of this experience there are several key insights about the long term planning process (LTPP):

- For the LTPP to be effective and valid it is dependent upon good and continual dialogue between the LTP planners and policy makers. Furthermore, as key stakeholders in overall defence planning these groups must feel that they are part of the LTPP.
- Not only is the scenario-based approach prevalent in current LTPP practice, it is a foundation of the LTPP. If specific scenarios are found to be highly sensitive politically, it is still possible to have overarching generic scenarios and use specific ones as representative cases at a working level with a generalisation of results.
- An LTPP well done has a stabilising influence upon shorter planning processes. This is particularly valuable in a changing and uncertain security environment.
- Political considerations must play an important part in defence planning activities. However, if care is not taken to ensure objectivity in the LTPP, it risks been seen merely as a political tool and being dismissed.
- Transparency, as well as efficiency and repeatability, of the LTPP will be enhanced by the integration of analytical models into the process. A further value to objectivity in the LTPP is the avoidance of legacy thinking.
- A plan can only be implemented if it considers real world limitations, such as legacy systems, length of the acquisition process, budgets and dependence on doctrine.
- A valid and robust LTPP should include the LTPP model presented in the handbook. It should not dismiss steps or factors merely because they are difficult to include or analyse. Despite this emphasis on completeness, the LTPP model is a flexible one that can be rapidly implemented provided necessary baselines have already been established.
- It is important that the LTPP proposes a sufficiently, but not excessively, concrete structure development plan. Only such a plan may be subject to cost-effectiveness evaluations and be constrained by budget limitations. No unnecessary decisions should be implied by the plan. This will ensure flexibility and robustness.
- The experience of extant LTPP practice is that there are important and valuable by-products of the process. These include the use of the LTPP to aid as a tool in educational processes, promulgation of new ideas and as an in-depth reflection on defence policies.

6.2 Recommendations

The handbook provides an overview of the LTPP. However, it is recommended that:

- There should be further work on providing output in capability terms as these will likely become more important in the future.
- This document should not be seen as a final statement, but as a living document. In order to achieve this, a web-site should be established and maintained. This web-site should include at least the handbook, a catalogue of models and focus papers. The value and structure of a permanent LTP community should be investigated to assist in developing and co-ordinating this evolution.

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ANNEX 1:

THE USE OF SCENARIOS

1 INTRODUCTION

A scenario is a description of a single way to a future (a developmental scenario) or simply a description of a single future situation (a situational scenario). The scenario content may be concerned with resources, technology, profits, management and command or the environment for our own future forces. In this annex, it is this latter meaning of scenario that is of prime concern – a future operations setting. In such a situation, the context of our own forces is quite fixed, but there are degrees of freedom with respect to what forces we want to put in there – subject to the constraints of the operations in terms of Rules of Engagements (ROEs), and to planning as described in chapters 3 and 4. It is precisely this choice of a cost-effective future force that is the heart of long term planning.

Scenarios provide focus and detail against which issues can be explored and assessed. They enable detailed evaluations of proposed operations with suggested force elements. The scenario based planning approach allows a (large) number of variables and their – possibly dynamic - relations to be investigated and integrated in a tangible and comprehensible picture. The approach further stimulates thought processes and allows ideas to be expressed and shared.

Scenarios are often organised in groups: in most applications a set of scenarios is used, covering (or 'representative of') a range of perceived possibilities (part of that multi-dimensional model of imaginable future situations called *scenario space)*. The scenario method in sum allows:

- Evaluation and comparison of alternative options (strategies) against the background of possible future developments.
- Integration of developments and events in one or more consistent images of the future.
- Identification of relevant circumstances, events and developments that might become important in the future.
- Provision of a common 'language' and structure to express and discuss different ideas about the future and how to deal with it.
- Reduction of the impact of uncertainty through the notion of 'robustness'.
- Exploration and understanding of the relationship and influence of the various forces involved in shaping the situation.
- Expression of opinions in the context of a shared 'framework'. This opens the way for a discourse on the basis of rational, commonly understood arguments.

Of course the scenario method has its challenges. Criticism centres on the following points:

- Labour and time intensive: It may take quite some time to create a scenario, and even more so to arrive at a comprehensive set of scenarios. Also, it can be quite time consuming to analyse various policy, operations and force structure options within the context of one or more scenarios, especially since this is usually a group process.
- Complex: Instead of chopping a problem into manageable parts, a scenario presents a large part of the problem context in one integrated construct.
- Credibility: A scenario is a thought construct, reflecting the mental quirks of its creator(s). The scenario will contain debatable assumptions.

- Too appealing: A scenario may appeal to such an extent that the premise that it is an illustration of a possible future and not a factual description is overlooked.
- Threat to obsolete logic: A scenario makes a future concrete. This future situation may render obsolete former logic or key planned investments.

A frequent observation is that the value of the scenario method also resides in the learning they produce. This indicates who should be involved: Not just those that are critical for the analysis as such - operational analysts, subject matter experts, senior and more junior people playing indicated blue, red or other roles, and officers in planning cells. But also, ideally, those in senior and executive management that eventually will sanction the planning recommendations and make and implement decisions. Although important parts of the scenario logic and the discussing of its implications should be written down in an 'audit trail', there is no substitute for 'being there' as an integral part of the process – and learning from it.

2. SCENARIO CHARACTERISTICS

2.1 What Is A Scenario?

Looking into the future is dealing with uncertainty. A scenario depicts a single plausible future situation and/or a path towards a future. It gives insight into policy issues, alternative options and critical factors. It contains a context-dependent description of a possible future situation, or a hypothetical chain of events leading to the situation and a desired final end state.

In LTDP, a scenario typically portrays a possible future situation in which military units are or might be employed in an operational sense. Which characteristics of that situation at what level of detail are described depends on the problem context: The type of planning or policy questions that are to be addressed using the scenario. Again depending on the intended use, the description might by highly stylised, e.g. dealing with a crisis between Blue Land and Red Land, but could also be quite realistic, e.g. placed in one of the crisis-prone regions of the world, actually – in the reality of the scenario - turned 'hot'. Some scenarios explore alternative futures that are considered plausible. These could be different paths that could be taken from a major decision point, possible states of affairs between nations or different conditions that could characterise the world as a whole.

In practical terms, a defence scenario might be anything from a one-page text document to a multi-page, multi-media presentation. The time horizon may range from the present to 30 years or more into the future.

2.2 Developmental And Situational Scenarios

There are two main types of scenarios: *developmental* scenarios and *situational* scenarios or images.

A developmental scenario takes the present situation as the point of departure describing a path to the future one. In this lies an implicit assumption of certain cause and effect relationships between different stages in the process, where events in one stage cause effects in the next and so on. A developmental scenario resemble a forecast in that the focus is on development over time, on causal relationships, chains of events and between different stages in the process. However, while the forecast assumes that the chain of events *will* happen, the developmental scenario only requires that the chain of events *may (well)* happen.

A situational scenario also changes over time, but the period is not one of years but the hours, days or months of an operation. The focus is on the future situation itself, more like a "snapshot". A situational scenario is typically used when studying possible consequences of different options available to oneself in that situation.

It is common to link developmental and situational scenarios. If so, only the situational scenario typically serves to investigate policy options.

2.3 Specific And Generic Scenarios

Scenarios are often described as either being "specific" or "generic". The dictionary defines "specific" as:

> "Specific: (1) having a real or fixed relationship to and usually constituting a characteristic of being peculiar to the thing or relation in question; (2) restricted by nature to a particular individual situation, relation or effect; (3) characterised by precise formulation or accurate restrictions: free from ambiguity."

From this definition it follows that scenarios can be specific in the sense of referring to the expected real forces and capabilities of a particular opposing nation for a given timeframe and geography; or it can be specific in having a specified level of detail. The usual term for the latter is "detailed"; and "specific" is reserved for the former sense. The term "detailed" will be dealt with later in this paper.

The dictionary definition of "generic" is:

> "Generic: relating or applied to or descriptive of all members of a genus, species, class or group: common to or characteristic of a whole group or class: typifying or subsuming: not specific or individual; general."

Obviously the term "generic" applied to a scenario only has a meaning if it is clear as to which aspect of the scenario is not specific or generalised. If the scenario were to be generalised in all aspects the analyst would be restricted to models based upon an abstract game like *Checkers* or *Go*. For a "generic" scenario to be of use to the defence analyst, it will need to be specific in terms of the types of forces involved and the capabilities of the opposing force(s).

For the purposes of this paper, the following will be used as definitions:

- Specific: having a fixed relationship to particular nation and geography.
- Generic: having generalised characteristics that are representative of a class of adversaries or a geographical region.

Each type of scenario has its advantages and disadvantages, as summarised in Table I.

	Specific Scenarios		Generic Scenarios	
	Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
Development	▪ Much data available (historical, geographic, country, etc.) ▪ Data facilitates scenario specification	▪ Historical events may limit creative thinking	▪ More freedom in specification of opposing forces and operating environments	▪ More time consuming to create all required data ▪ Increased need for creativity in developer
Validation	▪ Increased perceived credibility and plausibility ▪ Validation easier due to data available		▪ Can be evaluated on own merits, unencumbered by historical precedents	▪ More difficult to validate and ensure internal consistency
Acceptance	▪ Opposing force directly relevant to defence planning ▪ Direct link to defence policy	▪ Scenarios may be more politically sensitive ▪ Approval process may be more time consuming and difficult	▪ Less politically sensitive	▪ More difficult to relate to defence planning and policies
Employment			▪ Each scenario can represent an entire class of planning situations	▪ Effort required to ensure proper balance is achieved to avoid inadvertently biasing results

Table 1: A Comparison of Specific and Generic Scenarios

Actual scenarios used in defence planning are likely to be a mixture of specific and generic as the analyst will have to balance political sensitivity with, for the most part, the analytically preferable specific scenarios.

2.4 Detailed Or Framework Scenarios

A scenario approval process is lengthy. The number of approved scenarios should therefore be limited. However, one should be able to develop a scenario in detail according to the specific need: An approved scenario should be so flexible that its users may adapt to the specifics of their study. If an approved scenario is very detailed, it is probable that it may well be inconsistent at a lower level with the requirements of a particular study. Waiting for new approval is less desirable than the opposite and preferred approach; approved scenarios should avoid detail – they should set the framework for the scenario.

2.5 Robustness

A scenario should address a particular plausible issue of concern and/or task for defence planning. The entire portfolio of scenarios should address the full range of possible problems foreseen by defence policy. The probability of a specific scenario's occurrence is not usually an issue within a study, as long as results are robust across a range of possibilities. However, limited resources force a limitation of scenario numbers. The user will have to assess the likely impact of the scenario on the study's results and its importance otherwise. High impact / high probability scenarios will be included and low impact / low probability ones will be ignored. Decisions on objective criteria will be needed if it is necessary to select only some scenarios from the middle, alas common, ground of low impact / high probability and high impact / low probability scenarios.

3. SCENARIO CONSTRUCTION

3.1 General

As a model of the future, a scenario can serve to judge the value of alternative choices, decisions or actions with respect to their efficiency and effectiveness. Constructing a scenario involves identifying the driving factors and describing their possible development in a way that is sufficiently plausible and consistent to serve as a background for the decision problems to be examined.

One possible process of scenario development involves the following steps:

(1) Framing

(2) Mechanics

(3) Appraisal.

The framing process comprises identifying the purpose or the focal issue for the scenario. The mechanics are a systematic process of identifying the key drivers of the scenario with corresponding values and corresponding dependencies and variations among them. The appraisal phase involves a review of the scenario to check whether it satisfies some necessary conditions; normally this would be a review of the purpose, completeness of the required information and an internal consistency check.

Experience indicates that the number of scenarios should be kept as low as possible. Scenarios are based on an appreciation of current circumstances, perceived trends and expectations of future developments. As time passes, global characteristics change (political relations, technology, the environment, demographics, societal values, military structures etc.) and so should planning scenarios. Scenarios will evolve over time. To maintain a relevant, validated, approved set of planning scenarios is an onerous task in direct proportion to the number of scenarios in the set. To minimise the burden and facilitate this management process, the number of scenarios in the planning set should be kept to a minimum. Each scenario should offer some unique view(s) that cannot be obtained from any other scenario in the set. [While unnecessary scenarios should not be generated, the minimum number may need to be quite large. In particular for smaller scale operations, a relatively large number of (often simple) scenarios is required since few force element types are employed in each. Concurrency analysis also requires a reasonable number of alternative scenarios to test force pool robustness.]

3.2 Framing

Normally, scenarios are considered to be an effective tool for seeking agreement between groups for the basis for studies. An exact definition, or statement, of the problem to be solved will automatically reveal the important dimensions relevant for the study of that particular problem.

3.2.1 Scenario level

In military planning, the issue could be at different levels:

(1) Strategic – political.

(2) Strategic – military.

(3) Operational.

(4) Tactical.

A level 1 scenario focuses on the political challenges related to the situation of interest. Closely related to this is the level 2 scenario, which translates the political challenges into military strategic challenges. In NATO, these two levels have been merged into “planning situations”. At level 3 and 4, the military challenges are described in expanding detail.

3.2.2 Scenario dimensions

A scenario can be considered to assemble a set of dimensions with corresponding values in a consistent way into a meaningful whole – a point in the problem (scenario) space. The number of dimensions will be determined by the purpose of the scenario.

For defence structuring, the following dimensions are typically considered:

(I) General
- a. Timeframe.
- b. Conflict scale.

(II) Security Environment
- a. Area of interest {Europe, Middle East, Africa, …}.
- b. Type of situation {peace, crises, warfighting, information warfare}.
- c. International relations {confrontation, partnership, alliances, …}.
- d. Alliances {NATO, COW, …}.

(III) Parties
- a. Parties involved (nations, groups, NGO, terrorist cells…).
- b. Political objectives.
- c. Strategic military objectives.

(IV) Conflict
- a. Military capacities.
- b. Technological level.
- c. Geography.
- d. Duration.

(V) Background Information – facts (relevant sources)
- a. Concept of Operations.
- b. Doctrine.
- c. Technology.
- d. Time Dynamics.
- e. Trends.
- f. Threat Evolution and Sources (i.e. MC-161).

3.3 Mechanics Of Scenario Design

The construction of a scenario requires the identification of driving forces within the issue addressed. A variety of techniques can be used to identify these dimensions; i.e. structured brainstorming techniques. This report will not go into details of the application of the technique to identify such dimensions, but rather will assume the key dimensions have been specified.

Before starting out to write a scenario, a systematic method can be applied to ensure consistency in the variation of the dimensions of the scenario. This method, the morphological method, was originally developed by the Swiss astronomer Fritz Zwicky and used for technological forecasting in World War II. Zwicky developed this method to study chemical energy engines. The essence of Zwicky's approach was to identify a set of parameters (dimensions) that characterised chemical energy engines. Each dimension was defined according to a number of values. Together the set of dimensions and

values produced a matrix where any combination of values across all dimensions represents one possible state, in this case, of the chemical energy engine.

The morphological method comprises a variety of techniques, or practical procedures. One common technique, which will be described in this report, is that of the morphological box.

Each dimension is characterised, or specified, in terms of a set of independent values. Together, all dimensions with their associated values constitute a multidimensional matrix, a morphological box (see Table II). The matrix contains within it all the possible states of the given problem. An individual state of the problem, or the exact definition of a situation, results from a specific combination of values across the whole set of dimensions.

Values for each dimension constitute a complete and mutually exclusive set of possibilities. The specification of all possible vectors of values of the dimensions is the next step in the morphological analysis. Each vector represents one possible point in the multidimensional state space.

The final step in the morphological process involves choices of alternative situations (vectors) that may be relevant for further study. If the aim is to develop a scenario, this stage of the process consists of identifying combinations of values across the whole set of dimensions that are internally consistent[2] or possible and relevant to the frame of interest. Each vector of values that results from this final step provides the foundation for writing up a scenario.

Dimensions	**Values**		
Security environment	Confrontation	Partnership	
Parties: Nation 1 Involvement	Yes	No	
Nation 2 Involvement	Yes	No	
Group A Involvement	Yes	No	
Conflict	Small scale	Medium	Large

Table 2: Simple Example of a Morphological Box

Similar to morphological analysis, the prospective methodology of structural analysis may also be used in the construction of scenarios, when searching for the "main dimensions" for the problem being addressed. It is usable in structuring a system of variables, i.e. in identifying key variables, the most influential and/or the most dependent ones. Structural analysis, moreover, enables discerning variables relatively disconnected from the system, slightly influential and slightly dependent (heavy tendencies), which can be disregarded or whose value can be "frozen" from the outset, reducing complexity from the search.

3.4 Data Management

Data are always a challenge in LTDP; either because they are too scarce or too plentiful. If they are plentiful, then data may well be inconsistent with respect to uncertainty and quality. A solution to this challenge is data management.

The requirement for sufficient data, obtained from multiple sources, is essential to ensuring that valid comprehensive assessments can be conducted. Data requirements for scenario specification and analysis may appear immense. Having a “data expert” in addition to operations research analysts, subject matter experts, conceptual planners, and senior policy makers may help. The “data expert” is someone who is proficient in handling large data bases required to "feed" the analysis process for the

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[2] Assessing internal consistence of potential scenario vectors begins with identifying which scenario dimensions are linked (dependent or correlated) and which sets of associated values are feasible and which are infeasible.

scenarios. They know what exists currently in these databases (including the flaws), what can be usefully extracted, and what is planned for the future. Moreover, the interaction with the "data expert" over time may lead to refinement of the data development process.

When data are scarce the problem is different. It may be tempting to argue that scenarios should not be developed if there is data scarcity. However, if important issues require a specific scenario to be entered, lack of data should not prevent this. Rather the scenario should be developed with the best of knowledge and the higher uncertainty of the assumed chain of event within such a scenario given special consideration.

3.5 Appraisal

Two criteria for scenario design stand out as essential: credibility and relevance. Events in a scenario must make sense – be credible. Credibility must, however, not be confused with probability. Probability in itself is not a criterion; on the contrary, scenarios often deal with issues that may well have low probability. Credibility, however, means that a scenario must appear "possible". It also includes consistency in the variation of the different dimensions and their corresponding values.

Relevance, in terms of a scenario, means that it should be useful for its specific purpose. In the case of a scenario for military planning purposes, it should deal issues that may lead to a conflict, the conflict itself or other situations where military forces might be used. For this purpose, the scenario must contain enough relevant information to make it useful for the analyst or the decision-maker. This means usually that the scenario must not depart from assumptions that constitute a basis in terms of physical or political "realities" that have lasting relevance. For instance this can be the geographic parameters of a scenario, which military forces that are involved, threat perceptions, assumptions as to alliance postures etc.

4. SCENARIO PORTFOLIOS

4.1 Scenario Selection

The scenario-based approach considers multiple scenarios. This implies balancing limited analytic resources with a need for a large scenario set: Scenario selection must be performed. A three-step process is recommended:

- Refine the scenario set to meet specific demands.
- Identify possible scenarios consistent with the problem under consideration (using morphology or similar technique).
- Select only those covering key factors

A scenario portfolio should also include background information on the use and selection of scenarios and on how to achieve traceability. This information can include:

- Assumptions on the driving analytic factors.
- The selection of a representative set, including sampling of the security spectrum and the geographic interests.
- Prior uses of the scenarios in studies, including the study purpose and scope.
- Verification, validation and approval information[3].

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[3] A long term defence planning study, as with any operational research study, can be generalized as a six-step process described by Russell L. Ackoff (see Cook). One critical step in the process is the testing of the results for accuracy, reasonableness and appropriateness. Should the results fail any of these tests, one must return to the model development stage and adjust the model to improve its representation of the true problem.

4.2 Scenario Linkages/Dependencies

The above scenario selection process should ensure that there are common threads that link the various scenarios (i.e. across the spectrum of potential missions, the hierarchy of operations and the range of national and alliance objectives and interests). In other words, the scenario set should contain information so that:

- It reflects political and military objectives within the national or alliance hierarchy of operations (political, strategic and tactical).
- It addresses the full spectrum of missions and potential capabilities of both threat and friendly forces.
- It adequately addresses the uncertainty of threats in terms of nature and source.
- It adequately addresses the potential environments that are of concern to the nation or alliance.
- The portfolio provides assumptions on the concurrency of multiple scenarios and guidance for their use in studies addressing issues related to multiple missions.

The list above implies that the LTP scenario set should also appropriate for the requirements for other defence studies. Ideally a single, coherent, scenario portfolio should exist within a planning milieu and it should address the needs of long term defence planning. Therefore, it is important to consider the full range of potential types of defence studies when defining such a portfolio. These studies short-; medium and long term planning issues such as:

- Force structures and organisation.
- Mission analysis.
- Doctrine and tactics development.
- Cost benefit and effectiveness analysis.
- Training and education.
- Systems procurement.

4.3 Representing The Entire Security Spectrum

Uncertainty increases with the length of the scenario time horizon. This suggests that the scenario set for LTDP be broad enough to encompass the variation in possible future missions. This applies to all aspects of the portfolio requirements, such as security interests, the situation (e.g. political, military and cultural), mission parameters (e.g. objectives, scope, constraints and rules of engagement), friendly and adversary capabilities, and the environment. Unfortunately, the number of combinations is almost indefinite and cannot be analysed in any practical way. To bound the scenario set, a laundry list of possible scenario dimensions and values on those dimensions needs to be established. In LTDP the following dimensions have been found useful:

- External factors: security interests, political / military / cultural situation, mission objectives, mission constraints and limitations, rules of engagement, military scope, intensity, joint / combined mission.
- Capabilities of actors: organisation, order of battle, command and control, doctrine, resources, weapons equipment, logistics, skills and morale for friendly forces, adversary forces and non-combatants.
- Environment: Geography, region, terrain features, accessibility, vegetation, climate, weather and infrastructure (e.g. transportation, telecommunications and energy).

4.4 Scenario Flexibility

Since there is a wide variety of users, as well as uses, for scenarios, the scenarios of a portfolio should be flexible. This can be achieved by:

- Allowing different mission types to be included in a single scenario as actual mission types are often not discrete and include elements of more than one type.
- Providing information for the decomposition into more detailed scenarios for specific uses (i.e. a scenario hierarchy).

4.5 Concurrency

An adequate scenario portfolio must also contain information on multiple occurrences (activation) of scenarios. This information should include assumptions on:

- The concurrency of operations, including issues such as synchronisation of activities.
- The frequency and duration of various mission types.
- Allowed combinations (from a planning perspective).

The dependencies and linkages that might exist for particular combinations.

- Mission priorities, including the potential for redeployment.

A CASE of Scenario use: NATO's Defence Planning

Purpose

The purpose of the scenarios is to provide military context for the derivation of NATO wide force need for the medium-term and to provide advise for the Alliance's long term requirements.

Scenario Portfolio

The scenario portfolio must include coverage of the major military missions of the Alliance as determined by the NATO governments through the North Atlantic Council (NAC). These missions include:

- Collective defence of NATO territory as defined by Article 5 of the North Atlantic Treaty.
- The conduct of Crisis Response Operations, including Peace Support Operations.
- Consultation and co-operation (e.g. Partnership for Peace, WEU, etc.)

Therefore the scenarios selected should cover:

- The threats and potential threats to Alliance territory,
- Risks to the Alliance from crises arising outside of the NATO area of responsibility,
- The full range of peace support operations, which include:
  - Peace enforcement.
  - Peacekeeping.
  - Conflict prevention.
  - Humanitarian operations.
  - Peace building.
  - Peacemaking.
  - Peacetime co-operative activities and exercises.

Scenario Approval

The following steps are used to produce the set of "militarily approved" scenarios for NATO defence planning:

- Strategic Commanders (SC) designate staff to develop the scenarios.
- Staff consults NATO policy documents to determine key assumptions and principles for the scenario development.
- Key assumptions and principles are sent to the Military Committee (MC) for comment.
- Comments of the MC are incorporated or addressed by the SC staff.
- Key assumptions and principles are signed-off by the Strategic Commanders.
- Scenarios are developed using the above guidance, prior analytical experience and NATO intelligence sources, such as MC161, which describes threats and potential threats to the Alliance.

Scenario Detail

An example of a collective defence scenario from a NATO defence planning scenario portfolio would include the following information:

- Origin (i.e. the specific risk country).
- Areas potentially affected by the risk country.
- Possible military objectives of the risk country.
- Key events leading up to a crisis (i.e. indicators and warnings).
- Time scale, including information on warning and military preparation times.
- Potential duration of the crisis.
- The order of battle for the risk country.
- The portion of the risk country's order of battle employed against NATO.
- Potential courses of action by the risk country.
- Other related actions conducted against the Alliance nations.
- Possible NATO objectives in response to the crisis.

5 ACCEPTANCE

5.1 Scenario Acceptance Process

A scenario determines the cost-effectiveness of the planned force structure for that environment. Consequently, the scenario set influences the suggested force structure development plan. If those who dislike the proposed LTDP can attack the selection process, they will. As there is yet no established scientific and objective way of ensuring scenario authority, it must be done in a subjective way; through the endorsement of authoritative bodies or personnel.

The acceptance process is one of the most important in the planning process. A formally established process may be good practice and will facilitate endorsement. Formal endorsement has implications and benefits beyond the immediate confines of a single study. If the body recognised as the scenario authority has the required insight, it will ensure that its products, outputs, rules or area of expertise are accepted and used in a consistent manner. An added benefit of an established procedure is the ease with which changes, questions or explanations can be circulated among an identified set of offices or individuals thereby ensuring standardisation. Thus a well-developed scenario selection process encourages control, standardisation, and acceptance. A thorough process ensures the study will be well on the way to endorsement and that delays from objections to deductions/assumptions, incorrect policy or other factors will be kept to a minimum.

The scenario selection procedure ensures that appropriate experts or offices are involved. Even the simplest of high level scenarios can contain information or assumptions from many different areas. It is essential that those with technical, policy, intelligence, budgetary or other appropriate expertise be involved. However, care should be taken not to permit the process to become unwieldy and unresponsive.

Process developers should be wary of expanding their sphere of control too far and totally overloading the bureaucracy. For example, the scenarios required for many studies are at such a low level that approval for them is not appropriate. Duels between pairs of platforms may be an example. In such cases study leaders should map the low-level situation onto an approved scenario. For instance, it may be necessary to describe how the above duels might arise in an approved scenario. Not only will this ensure that low-level cases remain within the approved boundaries but will also encourage lower-level studies to feed higher ones and vice-versa.

5.2 Further Complications In The Acceptance Process: NATO As An Example

Within a NATO context, scenario approval implies the consensus of Alliance members. Thus, approving NATO planning scenarios requires a decision of the North Atlantic Council (NAC). But an approval of the scenario set could be interpreted as a direct statement of the Alliance's strategic intent. Typically, however, planning scenarios are only intended to capture uncertainty and allow prudent defence planning. Consequently, NATO "approved" scenarios at this level would be extremely unlikely, if not impossible to obtain. It should be noted that there is no political body within the Alliance beneath the NAC to whom political authority can be delegated. (This logic may be similar for national authorities as well.)

In theory, it might be possible to obtain NATO "military" approval at the senior level of military authority within the Alliance, the Military Committee (MC), but in practice this is not feasible due i.e. to the time constraints of that body. As military authority can be delegated within NATO, approval is feasible at the next highest military level, the Strategic Command (SC). The SC could and should obtain the comments of the MC; and, hence, their implied approval. Thus, while it is not possible to obtain NATO "politically approved" scenarios, "militarily approved" scenarios are achievable at the SC level with the implied consent of the MC.

When constructing scenarios, the SC should derive factors such as the type of mission and geographic area of interest from existent NATO agreed documents. These include the Treaty itself, the Alliance's strategic concept, Ministerial Guidance for defence planning and NATO agreed intelligence (e.g. MC161, which is the basis for risks to the Alliance). Interpretation of these source documents will still be required. Normally, the Strategic Commander delegates this task to a specific staff body. However, ultimate responsibility for the interpretation resides with the commander. It is also the responsibility of that commander to ensure that interpretation is consistent within the command, to co-ordinate interpretation with other NATO commands and to consult with senior military bodies.

It must however be noted that NATO at present has strong formal procedure for planning that looks more than 10 years into the future. The considerations above are more problematic the shorter the time horizon, but valid also for the 10 to 30 year frame; accepting scenarios implies agreeing on what futures one should planned and consequently be prepared for – and may be politically very sensitive.

6 CONCLUSIONS

A future ideal force structure should be the "optimum" within given cost constraints against a future scenario set. Scenarios represent specific representative future operating environments. The scenario set defines appropriate military contexts. This enables the analyst to effectively employ other techniques. This does require that the set of contexts (i.e. scenario set) is both appropriate and sufficient. This can only be determined if there has been a well-formulated problem definition with guidance for scenario development and selection.

Simply using multiple scenarios is not enough. The selected set must include scenarios that:

- Are useful for analysis in providing a range of outcomes sensitive to varying initial conditions.
- Reflect key defence planning objectives and tradeoffs.
- Explore to a suitable degree the military capabilities under consideration.
- Are credible and authoritative in that they have logical assumptions, reflect plausible situations; and have enough face validity to decision makers to merit approval.

While the above argument suggests that it is desirable to have as a large scenario set as possible, practicality prevents this. Therefore, the scenarios developed for an approved portfolio must have a high degree of utility. Qualities that improve the utility of scenarios include:

- A broad mission scope.
- Varying levels of hierarchies and command.
- Guidance for aggregation or dis-aggregation.
- A broad range of warfare areas.
- Those interactions which are germane to the military context being addressed through the scenario.
- Assumptions and guidance so that the analyst can assess the appropriateness of the scenario for the problem at hand.
- A description of past use and information substantiating the scenario (i.e. verification, validation and approval information).
- An assessment of the uncertainty in the scenario.

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ANNEX 2:

MODEL SUPPORT

This section identifies a range of quantitative and qualitative tools that are available to assist analysts in carrying out a long term planning process as described in chapter 4. A database of models and tools was compiled by the participating nations. Though the LTDP process can be performed using judgement alone, the use of more formal models increases both audit ability and utility. A wide range of analytical methods, models and tools can be used to support long term planning, and it should be emphasized that no single tool can support all stages of the process.

The remainder of this chapter categorises the models and tools in the database under the relevant steps of the long term planning process.

Campaign options and force packages [Steps 2 & 3]

This part of the process relies very heavily on military judgement, but some analytical aid is advantageous. The models mainly assist in force to task allocation at low level such as the number of aircraft needed to destroy a small group of tanks. For this purpose static scoring methods and rulebooks are commonly used. A wide range of simulation models that cover few-on-few engagements can also be used, but their use is normally constrained to a few cases due to limited analytical resources. Though resource intensive, wargaming can also be a very useful adjunct to test and refine campaigns.

Effectiveness testing [step 4]

The effectiveness testing, in which force packages are tested and refined, usually starts out with addressing each scenario separately. Some key variations need to be carried out to test sensitivity. However, experience tells us that it is better to obtain variety by addressing a wider range of scenarios instead of detailed sensitivity testing of a few scenarios.

As described in section 4, it is often useful to break down the effectiveness testing into areas such as generating the deployable forces and stocks, deployment to theatre, operational effectiveness or frontline force capability (warfighting or non-warfighting), sustainability, and quality of command and decision making. It is usually more informative to model and analyse these areas independently, at least in the first instance. By comparing the area effectiveness with performance levels defined or implied by the scenario, shortfalls and disproportionate force allocation could be identified.

Examples of models or tools identified in nations and NATO that can be used to support the LTDPP are shown in the next table. Further information on the models and points of contact is given in the database.

Area	Model	Nation
Force Generation	MADCAP (Mobilisation And Deployment Capabilities Assurance Project) Integration Management Initiative (MIMI)	USA
	Mobilisation Capabilities Evaluation Model (MOBCEM)	USA
	ADC Force Generation Model	UK
	Prospective Plan 30 Years PP30 (FORECAST)	FR
Deployment	Analysis Of Mobility Platform (AMP)	USA
	Enhanced Logistics Intra-Theater Support Tool (ELIST)	USA
	Global Deployment Analysis System (GDAS)	USA
	Joint Flow And Analysis System For Transportation (JFAST)	USA
	MADCAP (Mobilisation And Deployment Capabilities Assurance Project) Integration Management Initiative (MIMI)	USA
	Marine corps force allocation and deployment system	USA
	Mobility Analysis Support System/Airlift Flow Model (MASS/AFM)	USA
	Mobilisation Capabilities Evaluation Model (MOBCEM)	USA
	Port Simulation Model (PORTSIM)	USA
	Strategic lift capability optimisation (STRATL)	CA
Operational Effectiveness	Air campaign model	NO
	Combined Land Air Representation of Integrated Operations (CLARION)	UK
	Combined Arms And Support Task Force Evaluation Model (CASTFOREM)	USA
	Concepts Evaluation Model (CEM)	USA
	Conventional Forces Assessment Model (CFAM)	USA
	Cost Effectiveness And Force Balance Model	TU
	Defence dynamics	DE
	DYNACOM	NO
	General Campaign Analysis Model (GCAM)	USA
	H-FRAME (Hierarchical Framework) for High Level Defence Assessments	CA
	Joint Integrated Contingency Model - JICM	USA
	MUNGO	NO
	Theatre Assessment Model For Air Related Issues (TAMARI)	NC3A
	THUNDER	USA
	Vector-In-Command (VIC)	USA
Sustainability	Combined Mating And Ranging Planning System (CMARPS)	USA
	Dynamic Equipment Repair Optimisation (DERO)	USA
	Medical Analysis Tool (MAT)	USA
	SLOC-MODEL (Sea-Lines Of Communication)	NO
	Strategic Lift Capability Optimisation (STRATL)	CAN
C2 / ISTAR	Architecture Integration Model (AIM)	USA
	Architecture simulation and analysis platform	USA
	Multi-Int Allocation Tool (MIAT)	USA
	System Effectiveness Analysis Simulation (SEAS II)	USA

Construct the force pool (Concurrency) [Steps 5 and 6]

Much of this process is relatively mechanical and computer models can reduce the effort.

Area	Model	Nation
Concurrency	Substitution And Basic Inventory Allocator (SABRINA)	UK
	Scenario Operational Capability Risk Assessment Model (SOCRAM)	CA

Costing the force pool [step 7]

The area of cost modelling is wide and is the subject of a separate SAS panel (SAS 028) looking at cost breakdown structures and lifecycle costing for military analysts. They are due to report in June 2001.

Area	Model	Nation
Costing / Balance of Investment	The Multi-criteria Consensus Based Project Prioritisation Model (BESTSEL)	TU
	Defence Resource Management Model (DRMM)	USA
	Extended Planning Annex (EPA)	USA
	Force & Organization Cost Estimation System (FORCES)	USA
	Forecast Planning Programming Budgeting System And Assessment (FPPBSA)	FR
	Fundamental Investigation Of Operations (FIDO)	USA
	KOSTMOD	NO
	Life-cycle cost model for maritime command and control systems	NO
	Long term Capital Plan (LTCP) projects database (LTCP_DB)	CA
	Strategic Programming Model (TOPSIGHT)	CA

The models that support the remaining steps in the process are identified in the tables above.

Risk and cost trade-offs [step 8]

Examples of models and tools that provide an excellent capability to conduct "what-if" analysis are shown in the following table. In addition, many of the stochastic models identified earlier in the Operational Effectiveness area provide useful information on the certainty and range of estimates.

Area	Model	Nation
Risk and cost tradeoffs	Analysis of Mobility Plan (AMP)	USA
	Joint Integrated Contingency Model (JICM)	USA
	Substitution and Basic Inventory Allocator (SABRINA)	UK and USA
	Theater Assessment Model for Air Related Issues (TAMARI)	NC3A
	Team Expert Choice	USA
	Strategic Programming Model (TOPSIGHT)	CA

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14. Abstract

Common force planning practices are critical to NATO cohesiveness, also operationally. This Handbook is based on a review of current long-term planning practices in many NATO bodies and nations. Long-term refers the issues where planning focus is more than ten, typically twenty, years into the future. A common framework is provided to help planners in understanding the context and content of their work. It is hoped that the framework will enable increased and shared processual understanding within the alliance and PfP nations. The framework is described in detail; consisting in ten sequential steps. From "Analysis of the future environment" at the beginning until "Establishing a force structure" at the end. The Book contains one appendix where current NATO long term force planning is explained and commented in light of the framework. A second appendix lists various referenced analytical models, simulations and tools that are used in NATO and the nations.

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